

Contents

Foreword

1.0	History
1.1	The history of architectural lighting 12
1.1.1	Daylight architecture 12
1.1.2	Artificial lighting 13
1.1.3	Science and lighting 15
1.1.4	Modern light sources 16
1.1.4.1	Gas lighting 17
1.1.4.2	Electrical light sources 18
1.1.5	Quantitative lighting design 22
1.1.6	Beginnings of a new age kind lighting design 22
1.1.6.1	The influence of stage lighting 24
1.1.6.2	Qualitative lighting design 24
1.1.6.3	Lighting engineering and lighting design 25
2.0	Basics
2.1	Perception 28
2.1.1	Eye and camera 28
2.1.2	Perceptual psychology 29
2.1.2.1	Constancy 31
2.1.2.2	Laws of gestalt 33
2.1.3	Physiology of the eye 36
2.1.4	Objects of perception 38
2.2	Terms and units 40
2.2.1	Luminous flux 40
2.2.2	Luminous efficacy 40
2.2.3	Quantity of light 40
2.2.4	Luminous intensity 40
2.2.5	Illuminance 42
2.2.6	Exposure 42
2.2.7	Luminance 42
2.3	Light and light sources 43
2.3.1	Incandescent lamps 45
2.3.1.1	Halogen lamps 49
2.3.2	Discharge lamps 52
2.3.2.1	Fluorescent lamps 53
2.3.2.2	Compact fluorescent lamps 54
2.3.2.3	High-voltage fluorescent tubes 55
2.3.2.4	Low-pressure sodium lamps 56
2.3.2.5	High-pressure mercury lamps 57
2.3.2.6	Self-ballasted mercury lamps 58
2.3.2.7	Metal halide lamps 59
2.3.2.8	High-pressure sodium lamps 60
2.4	Control gear and control equipment 65
2.4.1	Control gear for discharge lamps 65
2.4.1.1	Fluorescent lamps 65
2.4.1.2	Compact fluorescent lamps 66
2.4.1.3	High-voltage fluorescent tubes 66
2.4.1.4	Low-pressure sodium lamps 66
2.4.1.5	High-pressure mercury lamps 66
2.4.1.6	Metal halide lamps 67
2.4.1.7	High-pressure sodium lamps 67
2.4.2	Compensation and wiring of discharge lamps 67
2.4.3	Radio-interference suppression and limiting other interference 67
2.4.4	Transformers for low-voltage installations 68
2.4.5	Controlling brightness 71
2.4.5.1	Incandescent and halogen lamps 71

2.4.5.2	Low-voltage halogen lamps 71
2.4.5.3	Fluorescent lamps 71
2.4.5.4	Compact fluorescent lamps 72
2.4.5.5	Other discharge lamps 72
2.4.6	Remote control 72
2.4.7	Lighting control systems 72
2.4.7.1	Lighting control systems for theatrical effects 73
2.5	Light – qualities and features 74
2.5.1	Quantity of light 74
2.5.2	Diffuse light and directed light 76
2.5.2.1	Modelling 77
2.5.2.2	Brilliance 78
2.5.3	Glare 79
2.5.4	Luminous colour and colour rendering 83
2.6	Controlling light 85
2.6.1	The principles of controlling light 85
2.6.1.1	Reflection 85
2.6.1.2	Transmission 85
2.6.1.3	Absorption 87
2.6.1.4	Refraction 87
2.6.1.5	Interference 87
2.6.2	Reflectors 88
2.6.2.1	Parabolic reflectors 89
2.6.2.2	Darklight reflectors 90
2.6.2.3	Spherical reflectors 90
2.6.2.4	Involute reflectors 90
2.6.2.5	Elliptical reflectors 90
2.6.3	Lens systems 91
2.6.3.1	Collecting lenses 91
2.6.3.2	Fresnel lenses 91
2.6.3.3	Projecting systems 91
2.6.4	Prismatic systems 92
2.6.5	Accessories 92
2.7	Luminaires 94
2.7.1	Stationary luminaires 94
2.7.1.1	Downlights 94
2.7.1.2	Uplights 97
2.7.1.3	Louvred luminaires 97
2.7.1.4	Washlights 100
2.7.1.5	Integral luminaires 101
2.7.2	Movable luminaires 102
2.7.2.1	Spotlights 102
2.7.2.2	Wallwashers 103
2.7.3	Light structures 104
2.7.4	Secondary reflector luminaires 105
2.7.5	Fibre optic systems 105
3.0	Lighting design
3.1	Lighting design concepts 110
3.1.1	Quantitative lighting design 110
3.1.2	Luminance-based design 112
3.1.3	The principles of perception-oriented lighting design 115
3.1.3.1	Richard Kelly 115
3.1.3.2	William Lam 117
3.1.3.3	Architecture and atmosphere 118
3.2	Qualitative lighting design 119
3.2.1	Project analysis 119
3.2.1.1	Utilisation of space 119
3.2.1.2	Psychological requirements 122
3.2.1.3	Architecture and atmosphere 122